PHYSICS

Took 63 Scientists To Prove Einstein Right

➤ THE FIRST direct experimental proof of an equation Einstein published in 1905 has been obtained by a group of 63 scientists working at the Transistor Teachers Summer School of Bell Telephone Laboratories, Murray Hill, N. J.

The equation shows that electrical conductivity takes place as a diffusion process. The scientists verified Einstein's relationship for electrons and holes. Electrons are small, negatively charged particles; holes are places where electrons should be but are missing, thus they act like positive charges.

To show the relationship, the scientists injected electrical pulses into single crystal rods of very pure germanium, then measured changes in the current. The way in which the current varied was observed with an oscilloscope, a television-like instrument.

According to Einstein's theory, the relationship between the diffusion constant and mobility of charged particles depends upon the temperature, a physical constant known as the Boltzmann constant, and the magnitude of the particle's charge. The Einstein relationship has been verified previously using colloidal particles and ions, the scientists state in the *Physical Review* (Dec. 15, 1952).

Science News Letter, January 17, 1953

ASTRONOMY

Most Bright Comets Are Two to Three Miles Across

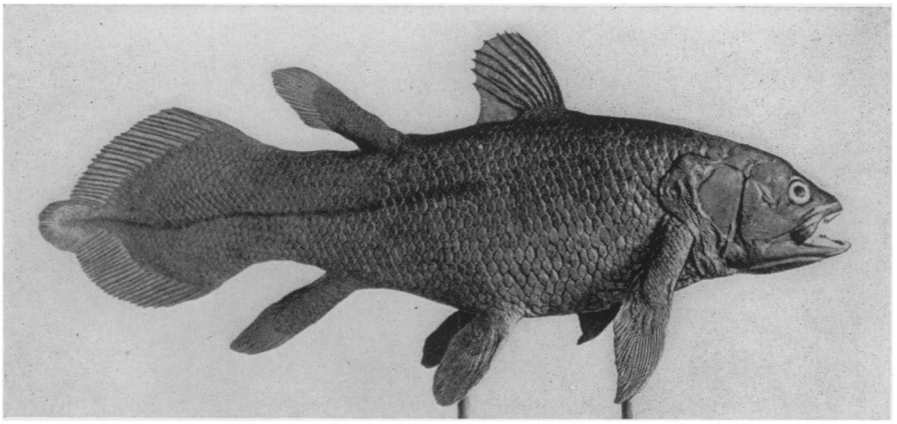
➤ BRIGHT COMETS that take hundreds and even thousands of years to complete their trips into the outer reaches of the solar system and return to the vicinity of the sun usually are two to three miles across, estimate Drs. Salah El-Din Hamid of Helwan Observatory, Egypt, and Fred L. Whipple of Harvard College Observatory.

These comets, with hearts of ice and frozen gases such as ammonia and methane, lose about one-half percent of their mass each time they swing near the fiery sun, Drs. Hamid and Whipple told members of the American Astronomical Society meeting in Amherst, Mass.

It was Dr. Whipple who, several years ago, suggested that the solid nucleus or heart of a comet is turned by the sun's heat into the huge cloud of gas which makes up the head of a comet. The fan-like tail, by which a comet is most easily spotted, is caused by the sun's radiation that forces the gases and dust back from the comet's head.

It is the jet action of the vaporized ices on the comets that accounts for the observed deviations of the comets from the motions expected of inactive comet nuclei, the astronomers stated. From the way in which a comet actually wanders from its proper path, Drs. Hamid and Whipple can calculate how much the comet reduces its waistline each time it visits the solar system.

Science News Letter, January 17, 1953



ANCIENT FISH—Shown here is a photograph, taken from a cast at the South African Museum, of a five-foot coelacanth, a "living fossil" fish believed extinct until its capture in 1938 and again recently.

MARINE BIOLOGY

Capture "Living Fossil" Fish

South African finds a coelacanth, "missing link" specimen that allows glimpse of life in the past. Strange fish scale at Smithsonian shows Gulf of Mexico may hide unknown fishes.

➤ THE RECENT capture in African waters of a coelacanth, a primitive lobe-finned fish of a family thought extinct for at least 50,000,000 years, has reopened a mystery buried in files at the U. S. National Museum in Washington since 1949.

Are there coelacanths or other "extinct" fishes hidden in the depths of American seas? On the evidence of a single fish scale sent to the museum from Tampa, Fla., in 1949, fish specialist Dr. Isaac Ginsburg believes that a large, primitive-type fish, unknown to science in the region, dwells in the Gulf of Mexico.

"This scale is like no other fish scale I have ever seen," Dr. Ginsburg said. It is not the scale of any of the several hundred known fish species of the Gulf of Mexico, he stated, and it is apparently of primitive structure.

It is not impossible that this is the scale of a coelacanth, Dr. Ginsburg said, but added that the real significance of the unique fish scale is that—coelacanth or not—it shows the existence of creatures beneath American waters unseen and unknown to science.

How Dr. Ginsburg obtained the mystery scale is an absorbing account in itself. A woman from Tampa, Fla., buys fish scales from fishermen to use for making ornaments. One day in 1949, she bought a gallon of scales like none she had ever seen before, about one and a half inches in diameter, the size of tarpon scales but of a different structure entirely.

She was so intrigued by her purchase that she sent one of the scales to the National Museum for identification, where it came into Dr. Ginsburg's hands.

Dr. Ginsburg and other fish specialists at the museum were mystified by the enigmatic scale. What is was from, no one knew. He wrote the woman, asking for more scales and information about the man that brought them in, what the fish looked like and where it was caught.

This letter was never answered. The woman did not realize the possible value of her "ornamental scales" to science. And so, if any of that precious gallon of scales exist today, they probably lie forgotten along with other "souvenirs of Florida" sold to tourists the country over.

Though America may or may not be the home of coelacanths, the recent capture of a five-foot, 120-pound specimen in the Indian Ocean near Madagascar does mark the second actual specimen recovered by scientists.

The first coelacanth ever brought to the attention of science was caught in 1938 near East London, South Africa, in a commercial fisheries trawl. (See SNL, April 1, 1939, p. 195.) This discovery excited the attention of scientists the world over, because the whole family of lobe-finned (crossopterygian) fish to which it belongs had supposedly been extinct for more than 50,000,000 years. The family of lobe-finned fishes are thought to have given rise to amphibians, the first true four-legged, partly terrestrial animals, of which frogs and newts are examples.

It was known from fossil remains that lobe-finned fishes had central bones in their fins, which could have given rise to true terrestrial limbs. They had functional lungs, their teeth were almost identical with those of primitive amphibians, and in other ways

they resembled the first animals that roamed on land.

These were just some of the things scientists eagerly expected to examine when news of a real flesh and blood coelacanth turned up after a blank 50,000,000 years. But before it could be studied, the world's most important fish had putrified, its priceless internal parts had been thrown away by a taxidermist, and only the skeleton and mounted skin remained.

Prof. J. L. B. Smith, of Rhodes University, South Africa, took it upon himself to find another coelacanth. He distributed illustrated leaflets up and down the east coast of Africa, printed in English, French and Portuguese. He cajoled trawler skippers to watch for the precious fish. He offered a handsome reward for its capture.

Then in December his 14 years of searching paid off. A native of the Comoro islands, near Madagascar, was about to sell a large, queer fish in the local market, when another native excitedly told him it was worth "plenty money." The second native had recognized it from one of Prof. Smith's leaflets as a coelacanth.

The fisherman received £100 ($280) for his catch. But to scientists, the intact, wholly preserved coelacanth lies beyond all price for the great light it promises to throw on the mysteries of evolution and the migration of life from water to land.

Science News Letter, January 17, 1953

PHYSICS

Touch of Hydrogen Helps Make Radiocarbon

➤ JUST A touch of hydrogen helps when scientists make carbon 14 out of beryllium nitride. Carbon 14 is the radioactive form of carbon being used so extensively in biological research. The Atomic Energy Commission lists over 220 different compounds of it available for scientific work.

Some of the problems of making radiocarbon in the Oak Ridge nuclear reactor were told to the American Association for the Advancement of Science meeting in St. Louis by Dr. Alexander Langsdorf, Jr., of the Argonne National Laboratory.

Not ordinary carbon, but nitrogen, is the raw material for carbon 14, as it is made in the Oak Ridge pile by atomic transmutation. To get the nitrogen, which occurs in air as an inert gas, into a form more easily handled, scientists of the A.E.C. decided in 1946 to combine it with a suitable metal, and found beryllium best.

Experience since that time in large scale production of beryllium nitride has led to discovery, recently patented by Dr. Langsdorf and assigned to the A.E.C., that too much purity of ingredients hampers the process. Hydrogen making three percent of the gas helps combine the nitrogen with the beryllium. After irradiation, the newly formed carbon is found in a number of different combinations, Dr. Langsdorf reported at the meeting.

Science News Letter, January 17, 1953

GENERAL SCIENCE

Russian Science Corrupted

Predicts destruction of science in U.S.S.R. soon to spread to other fields so far untouched. Physics, mathematics and engineering there now appear to be adequate.

➤ THE DESTRUCTION of science in the Soviet Union caused by slavish following of the communist party line is about to spread to many fields that have not yet been corrupted, Dr. Conway Zirkle of the University of Pennsylvania predicted to the American Association for the Advancement of Science meeting in St. Louis.

Hints have appeared in the Soviet press that discussions of various fields of science are planned, which will be followed by recantations of those on the losing side and the triumph of charlatans, if previous course of events is followed.

Despite the fact that a large part of science, including genetics, statistics, psychology and psychiatry, biology and agriculture, physiology, pathology, medicine and astronomy, has been ruined, Russian physics is definitely good, mathematics is excellent and engineering is probably adequate for all military and civilian purposes, in Dr. Zirkle's analysis.

The reason that physics, mathematics and engineering appear to be adequate is either that their results can be tested by performance, such as by exploding an A-bomb, or that the commissars cannot understand enough to interfere.

The communist domination of science is out of even communist control, Dr. Zirkle pointed out. The final authority in science is in the hands of non-scientists and the treatment of scientists has been such that they dare to tell their masters only what they believe their masters want to hear. The political authorities in Russia have thus cut themselves off from any access to the truth in many scientific fields.

All Russian scientists, whether stupid, intimidated or disgusted, have been reduced to playing the roles of charlatans when they deal with politicians. The rulers of Russia are consequently not justified in believing anything that their scientists tell them. They cannot correct conditions, even if they are positive that quackery is rampant.

In some fields of Russian science there are no honest and capable scientists left, Dr. Zirkle has found, and these sciences can recover in Russia only by the importation of scientists from abroad to train and educate a new generation of Russians. From the evidence provided by studies by many experts, Dr. Zirkle finds:

Genetics has been replaced by an archaic quackery which repudiates evolution applied to man and upholds the inheritance of acquired characters.

Statistics has lost its basic honesty and is now used to falsify data for propaganda purposes.

Psychology and psychiatry are practically dead, with little chance of recovery.

Biology and agriculture are permeated by quackery and nothing of importance can be expected of them.

Physiology, pathology and medicine are so forced into a rigid and stupid orthodoxy that their future development is inhibited, but some sound practices survive.

Geology is subjected to political attacks, and pure research in this field is discouraged.

Astronomy includes the amusing quackery of astro-botany or the study of plant life on the planets. Certain theories as to the origin of the solar system are forbidden, but much excellent work is being done by Russian astronomers.

Much good chemical research is being done, although certain theories, such as resonance, are forbidden.

The basic philosophical background of modern physics is called idealistic and condemned and many of the words are separated from their meanings. Basic research in physics is probably not hurt.

Science News Letter, January 17, 1953

PUBLIC HEALTH

Public Health Service Has Inspection Privileges

➤ WHEN CONGRESS considers the request of the Food and Drug Administration to restore to the Food, Drug and Cosmetic Act the factory inspection provision, it may take into account the fact that it has given the U. S. Public Health Service inspection privileges for control of manufacture of biologics such as vaccines, serums, antitoxins and the like.

The factory inspection in the Food and Drug Act was invalidated by a Supreme Court decision on Dec. 8, 1952, on the ground that the law was not clear on this point. Food and Drug officials state that they cannot be sure a product is manufactured under sanitary conditions unless they can inspect the premises where it is made and observe the methods of manufacture.

The law governing biologics control says officers, employees and agents of the Public Health Service "may during all reasonable hours" enter and inspect plants where biologic products are made. In actual practice, Public Health Service officers inspect such plants regularly once a year and oftener if it seems advisable. This inspection is one of the main jobs of several Public Health Service doctors.

Science News Letter, January 17, 1953